Re-implantation Should be the Standard Technique

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Homburg, May, 2017

The Leviev Heart Center


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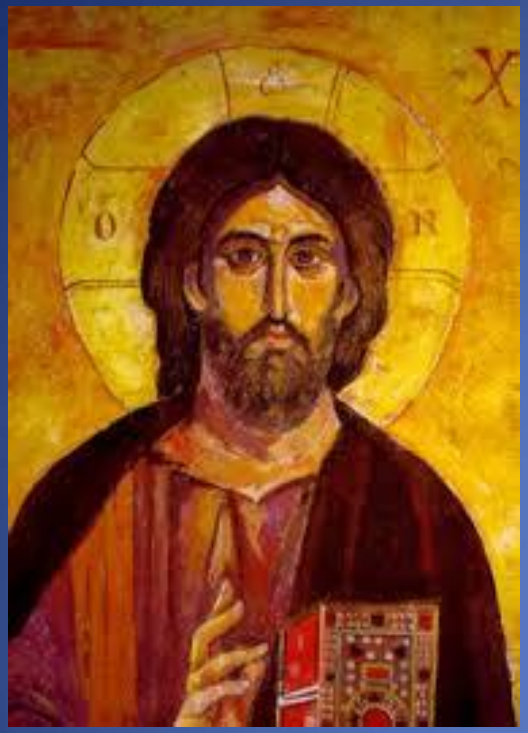
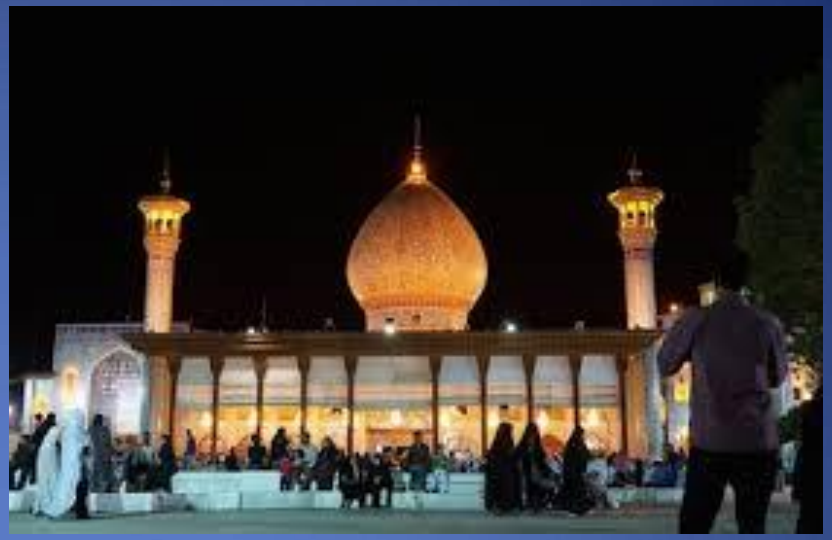
הפועל תל-אביב
עונת 2009/10

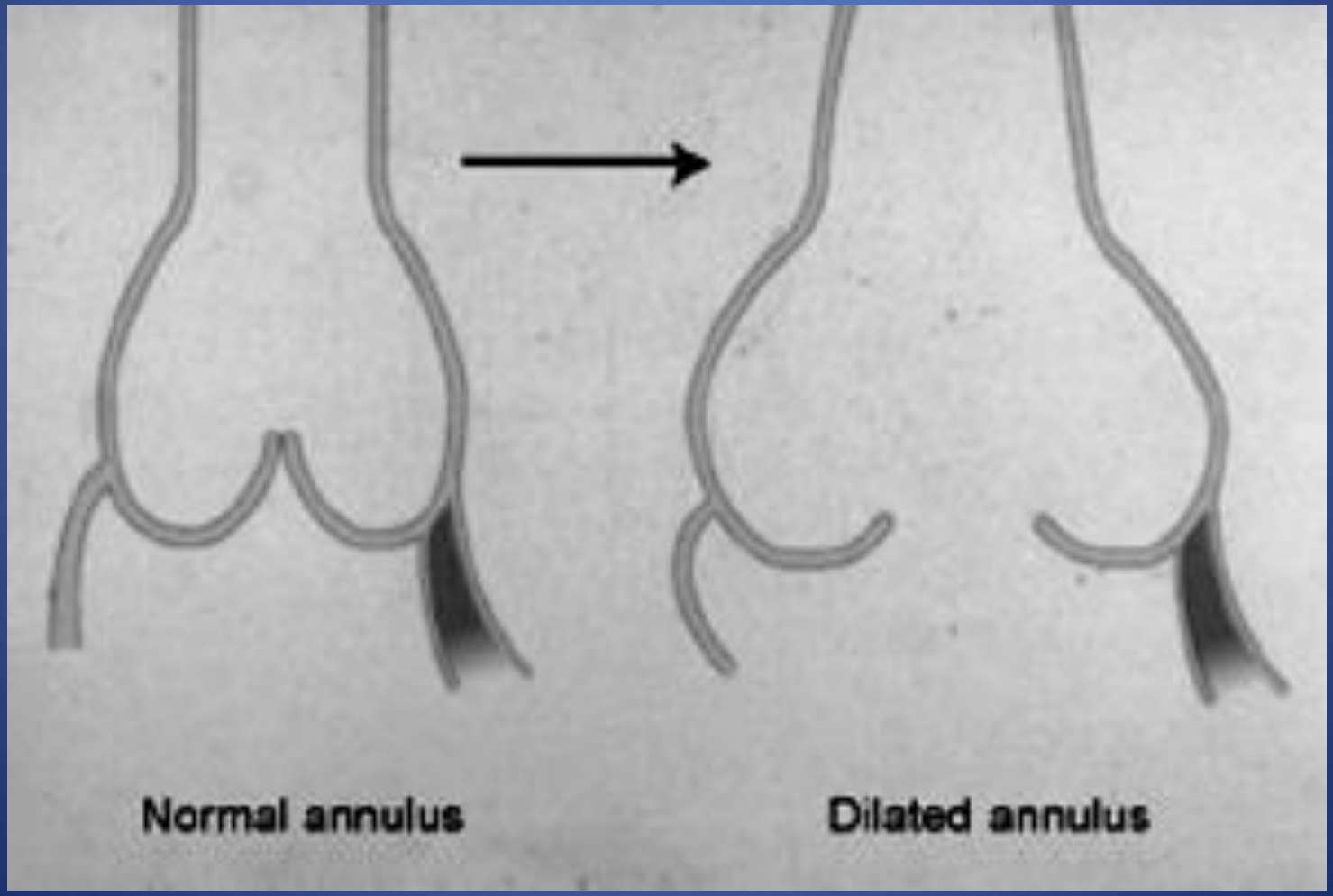




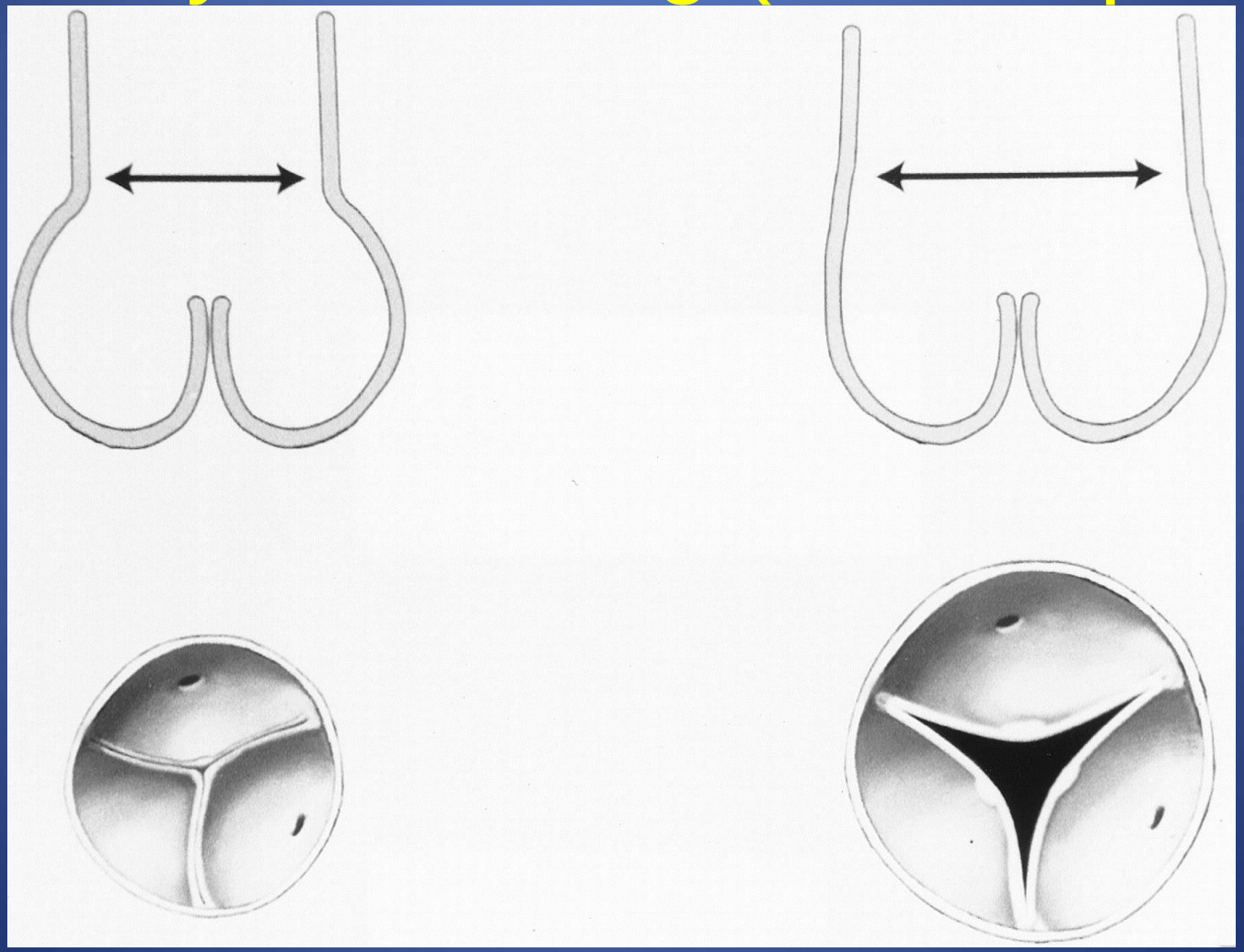
Important Factors to Compare

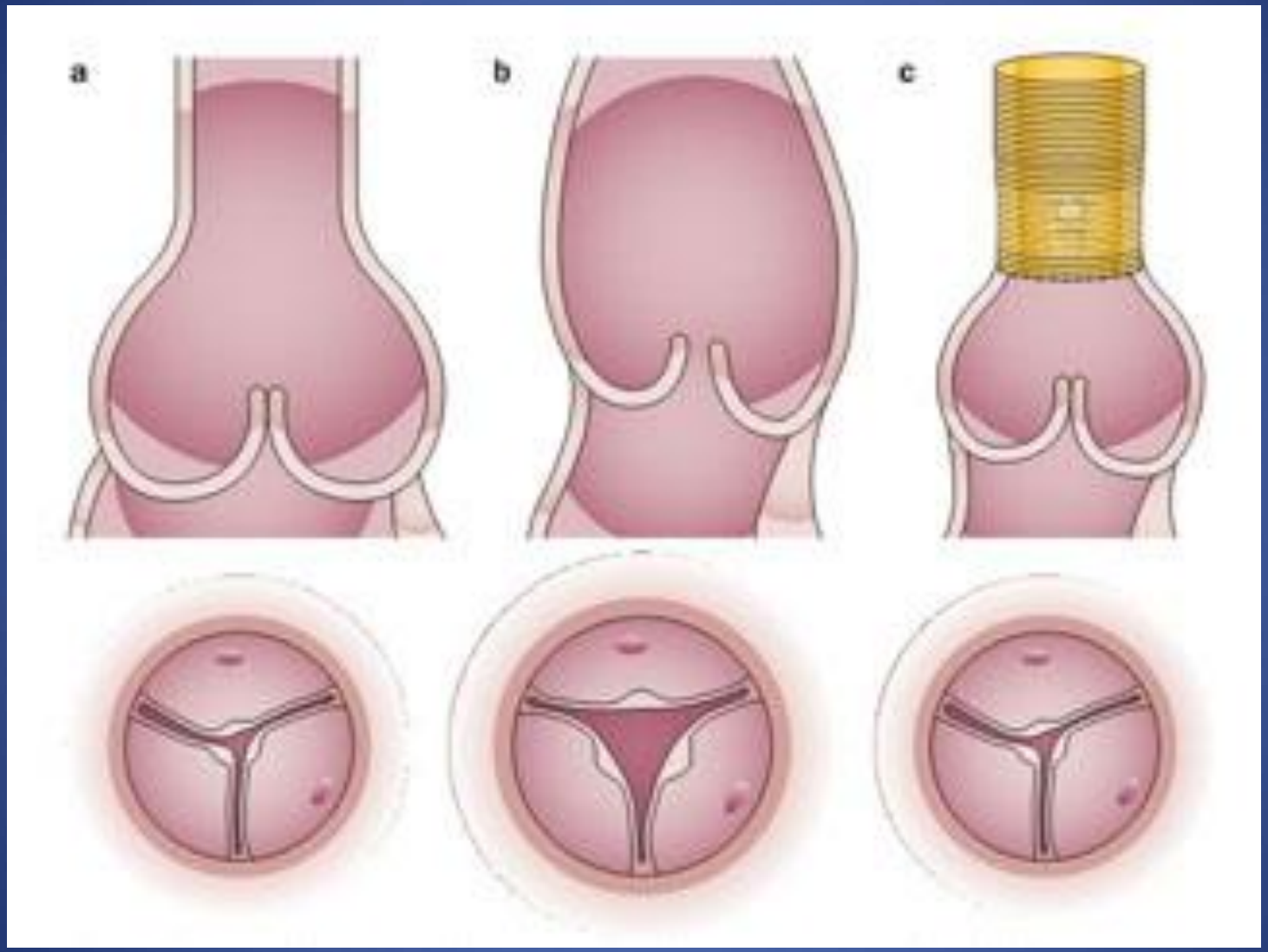
- Different phenotypes
- Surgical complexity
- Operative times (CPB, Cross-clamp)
- Early outcomes: morbidity & mortality
- Long term outcomes: freedom from re-op, freedom from recurrent AI
- Sub-populations: connective tissue (Marfan etc)

“Type 1” Root, Younger (10-40y), Hereditary connective synd. (Marfan, Loyes-Dietz, BAV with “root phenotype”)

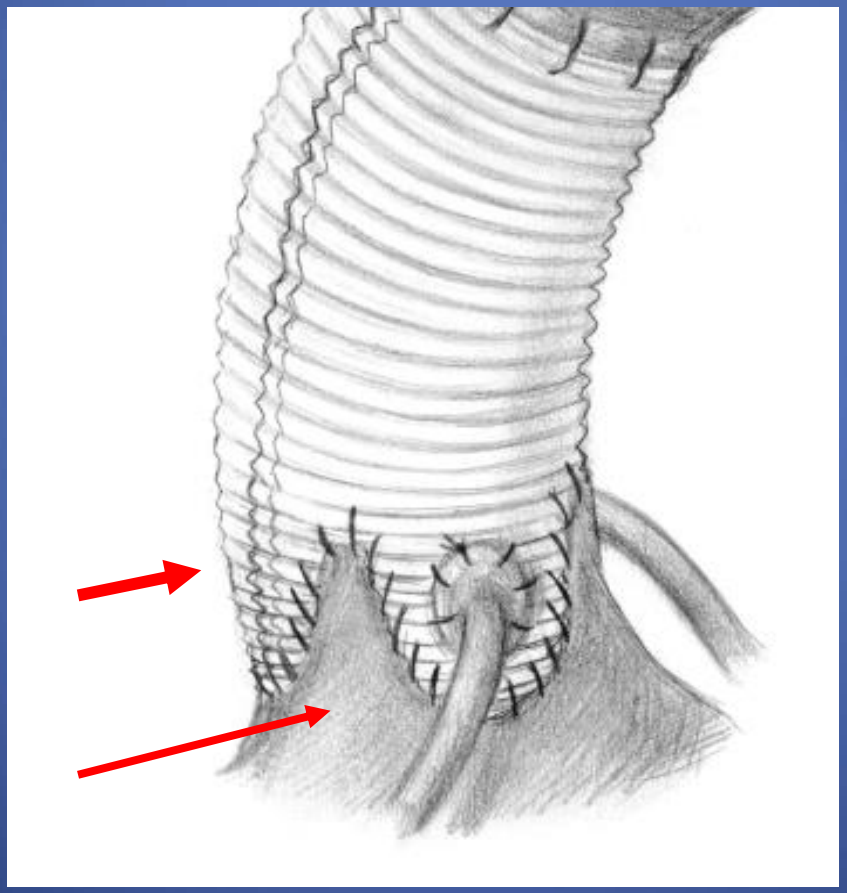


“Type 2” aneurysm:
Older >50 y
primary ascending (tubular part)

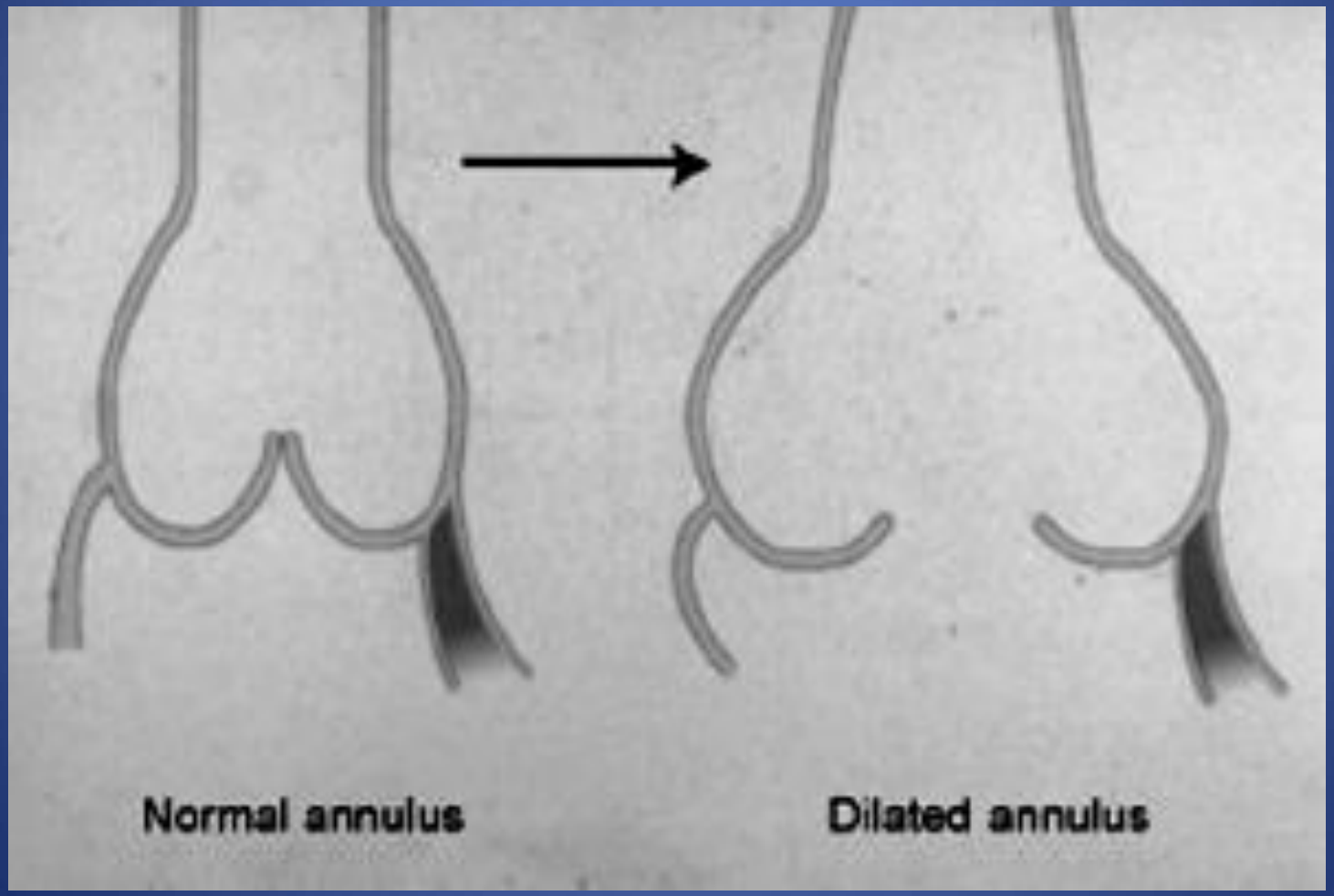



a
b
c

Root Remodeling (M. Yacoub)

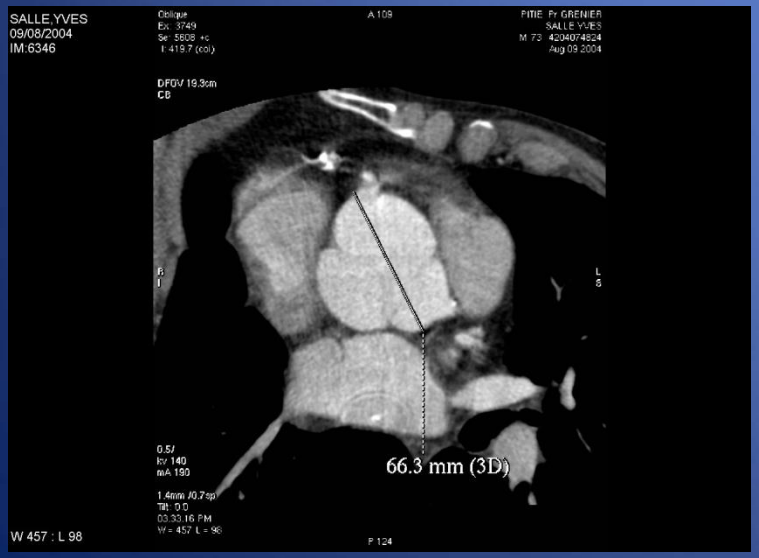


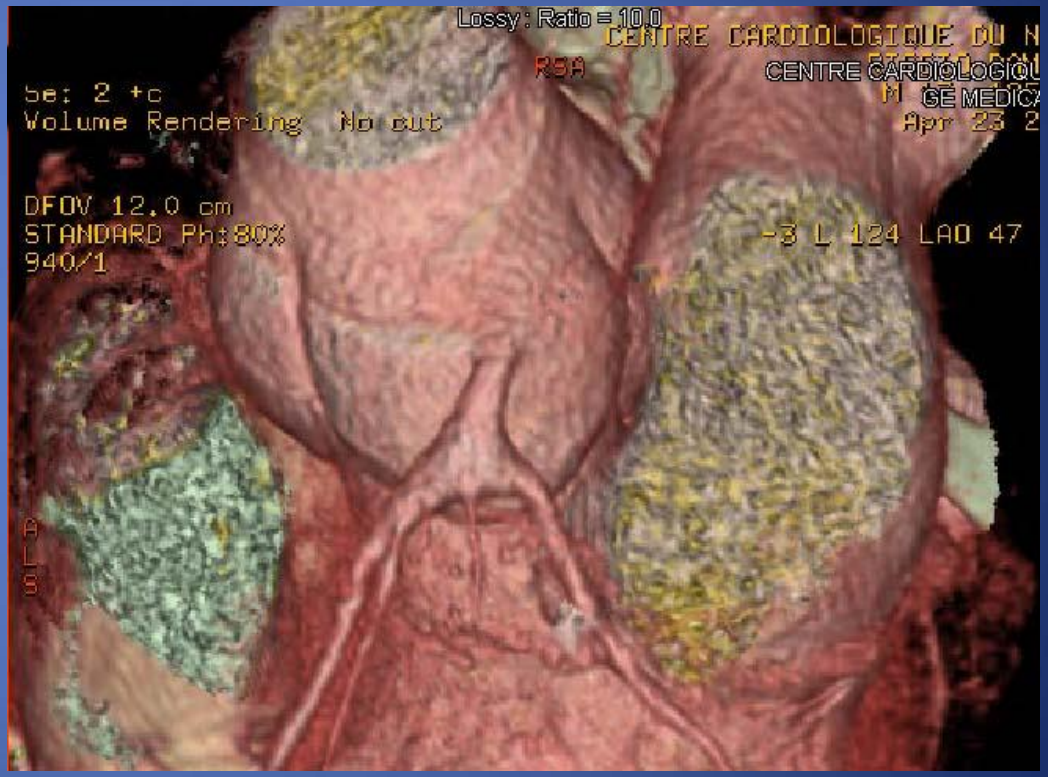
Type 1-Root Phenotype



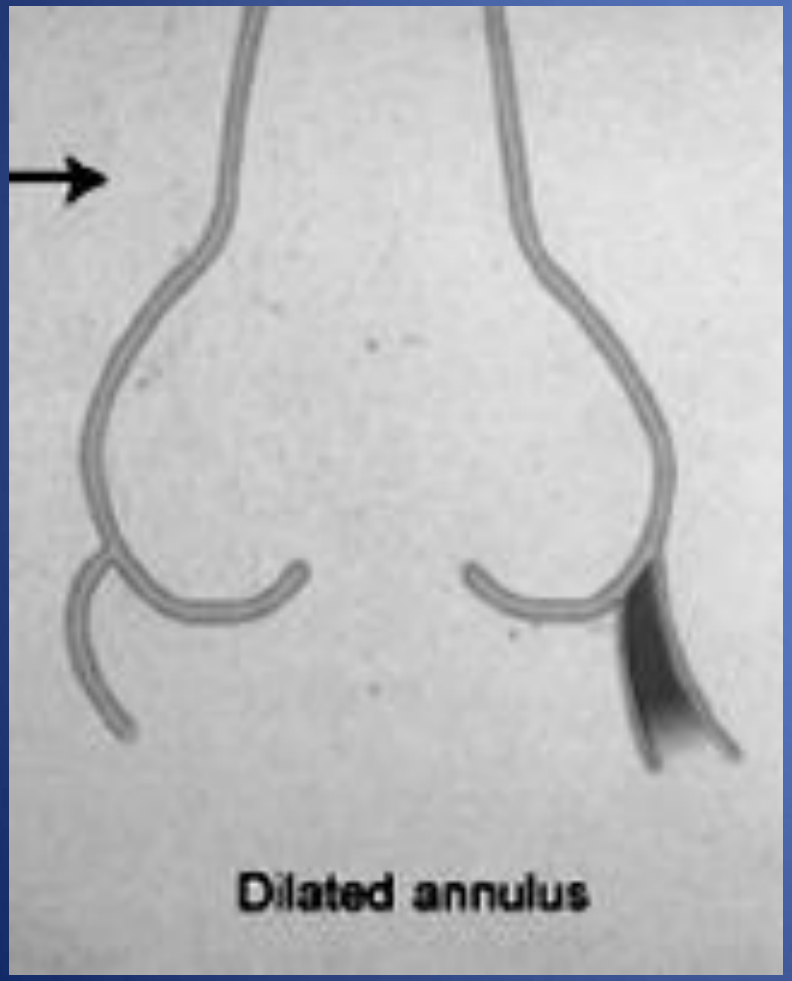
CT Scan

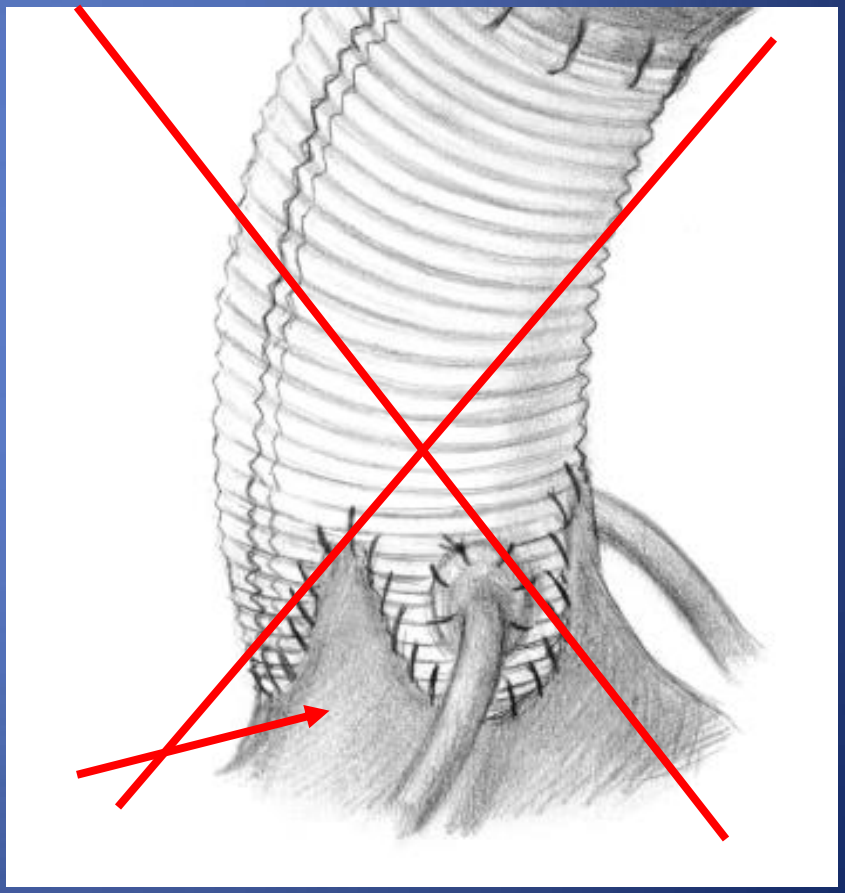

SALLE.YVES
09/08/2004
IM:6335
W 539 : L 177


SALLE.YVES
09/08/2004
IM:6346
Oblique
A 109
PITIE Pr GRENIER
SALLE.YVES
Aug 09 2004
DFOV 19.3cm
CB
66.3 mm (3D)
W 457 : L 98


Lossy : Ratio = 10.0
CENTRE CARDIOLOGIQUE DU N
RSA
Se: 2 +c
Volume Rendering No cut
DFOV 12.0 cm
STANDARD Ph:80%
940/1
-3 L 124 LAO 47
Apr 23 2

Root Remodeling (M. Yaacoub)

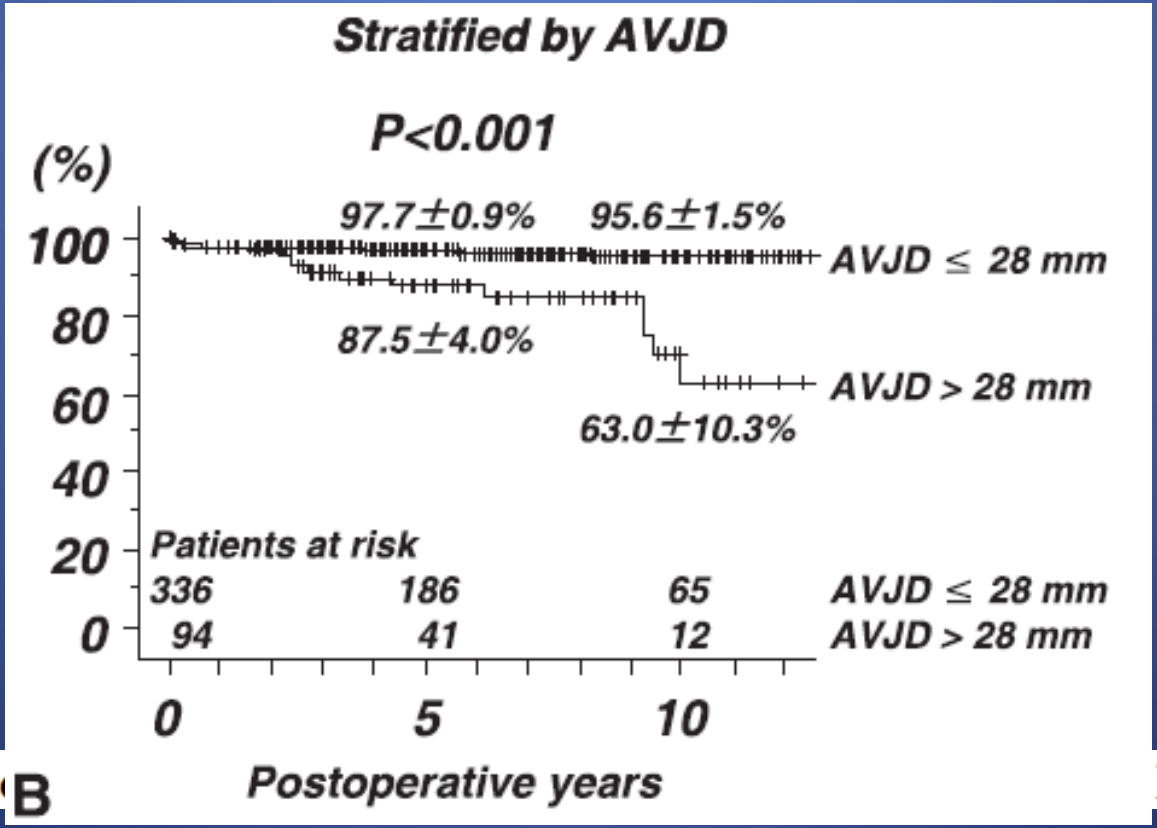




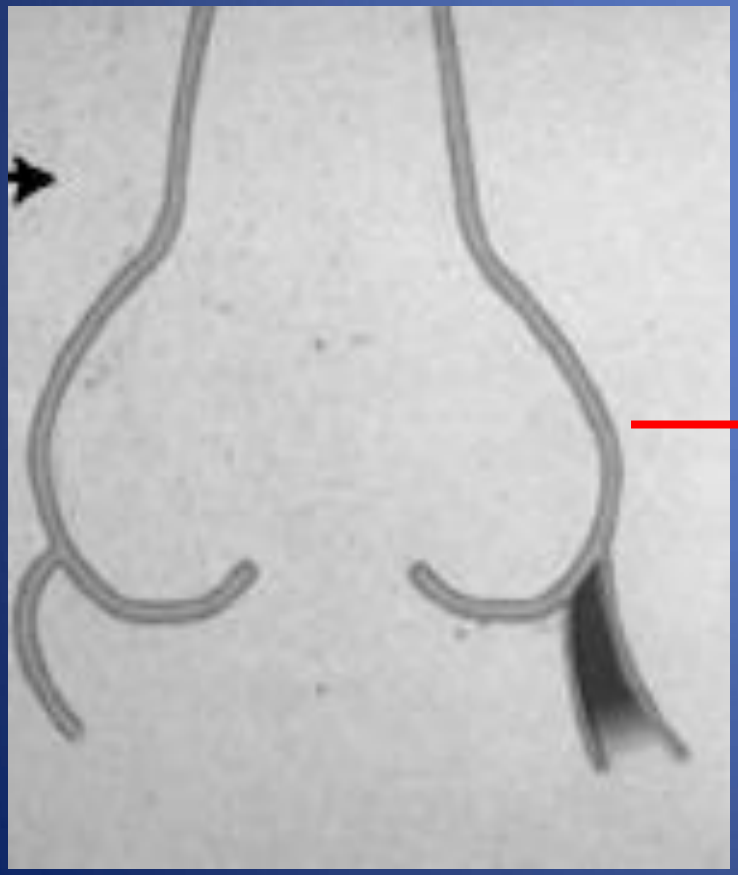
Preoperative aortic root geometry and postoperative cusp configuration primarily determine long-term outcome after valve-preserving aortic root repair

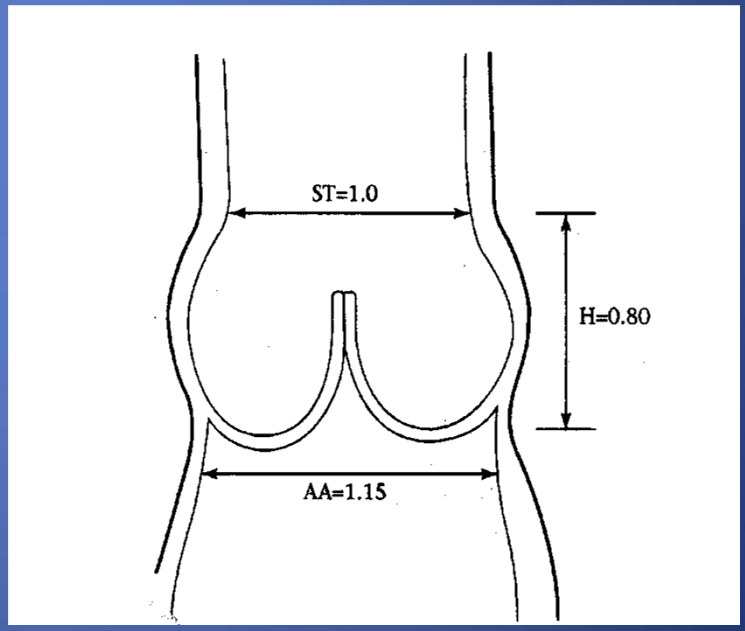
Takashi Kunihara, MD, PhD,[a] Diana Aicher, MD,[a] Svetlana Rodionycheva, MD,[a] Heinrich-Volker Groesdonk, MD,[a] Frank Langer, MD,[a] Fumihiro Sata, MD, PhD,[b] and Hans-Joachim Schäfers, MD, PhD[a]

1995-2009, 401 remodeling, 29 re-implantation (24 marfan pts)



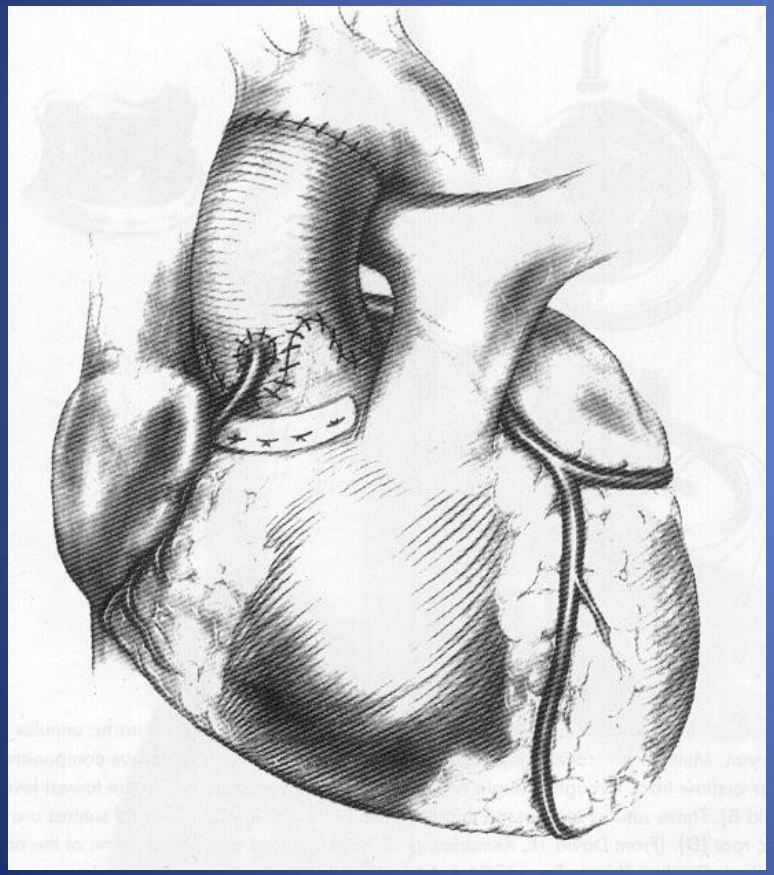
Restore Normal Root Geometry

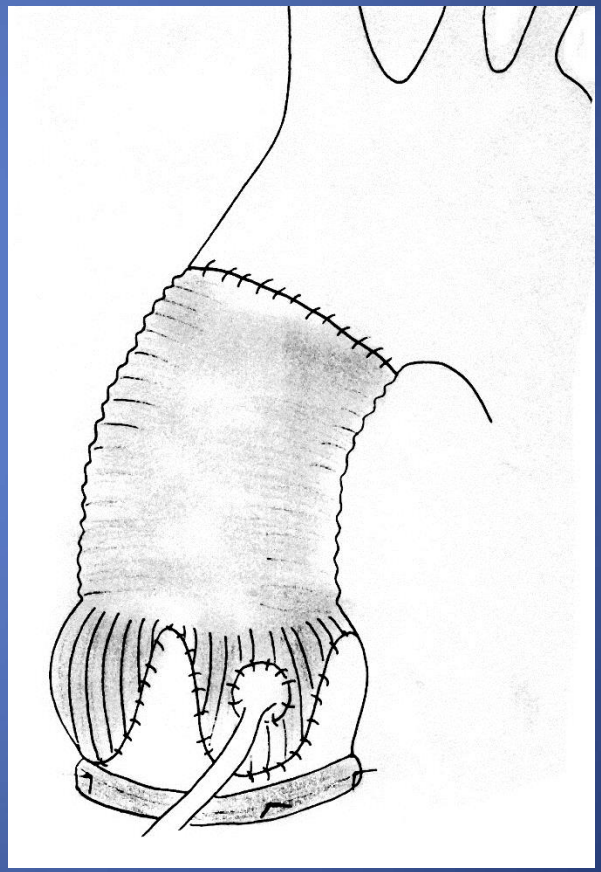




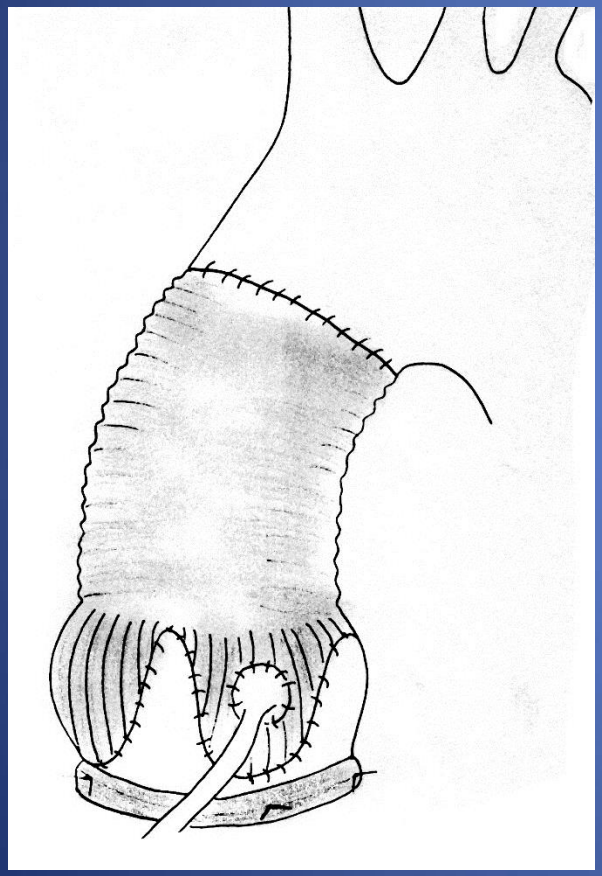
Kunzelman K, 1994

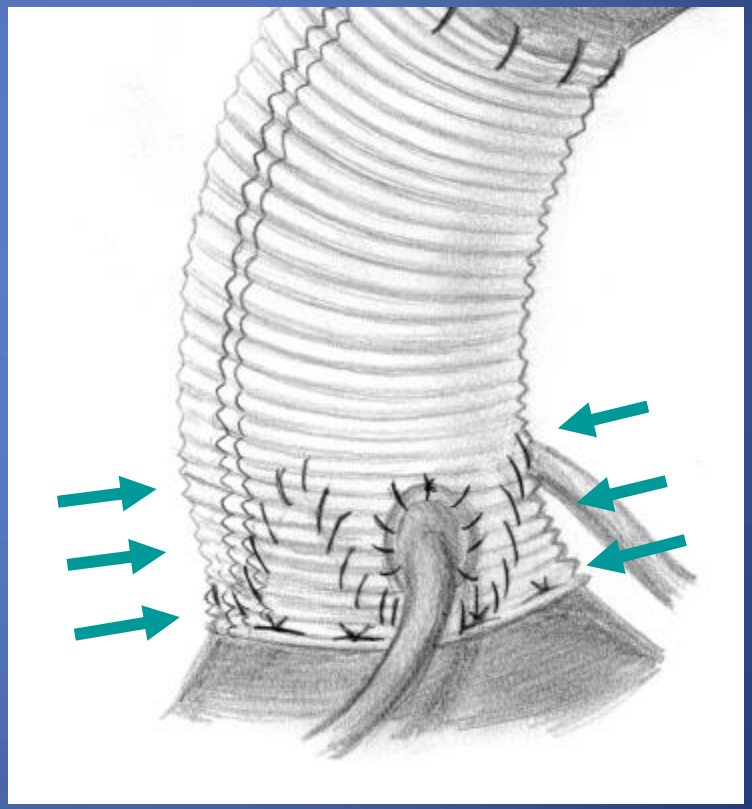
Remodeling +annuloplasty (D3, Lansac)

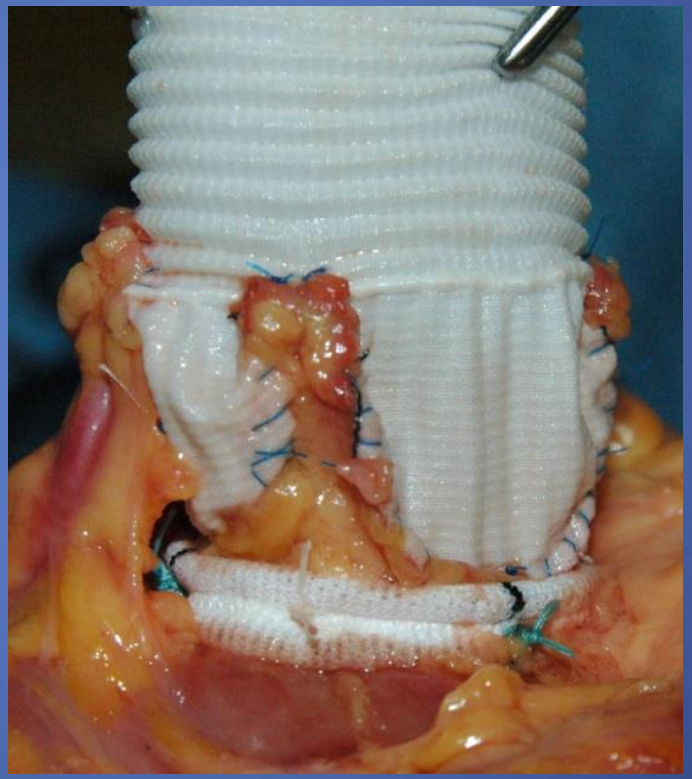




Compare

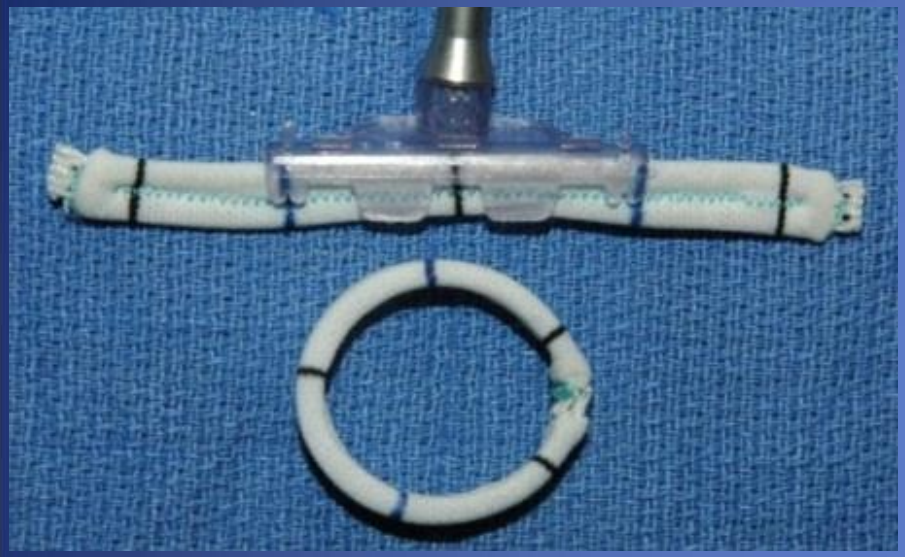






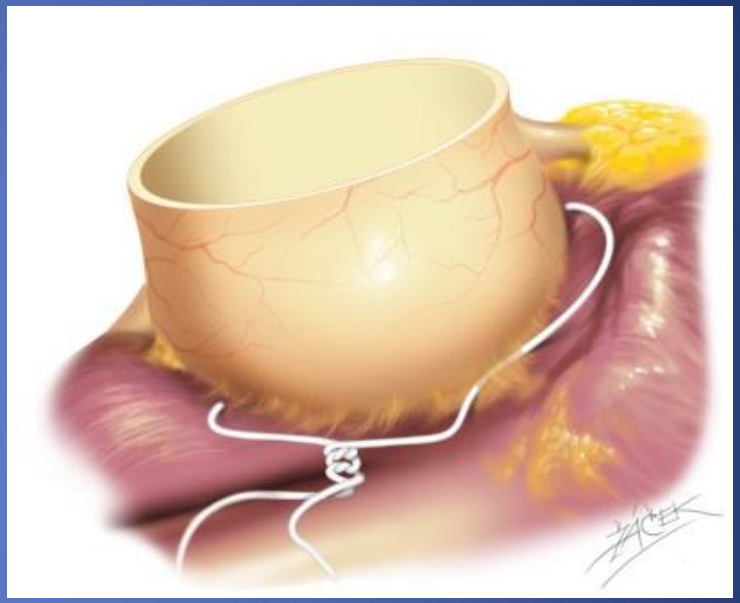
Courtesy E Lansac

Expansible Band



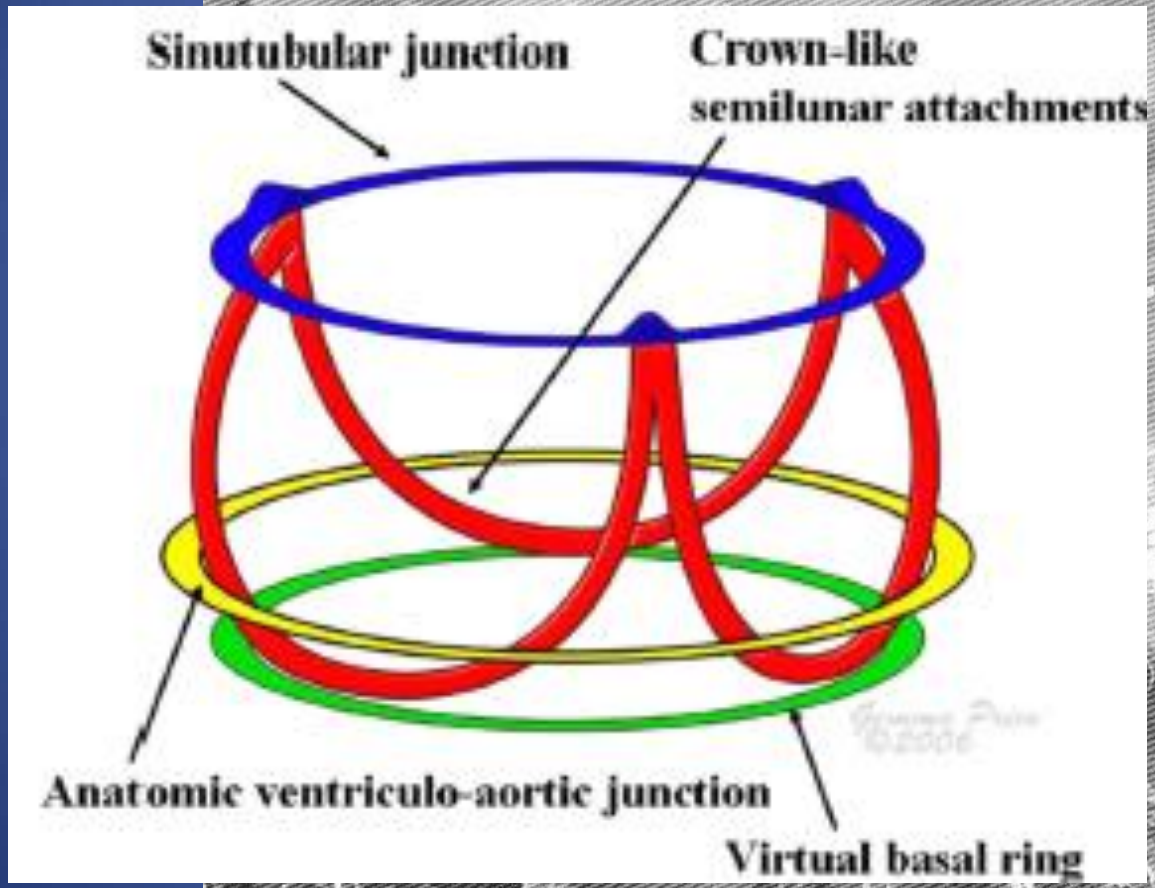
Lansac 2006

PTFE annuloplasty

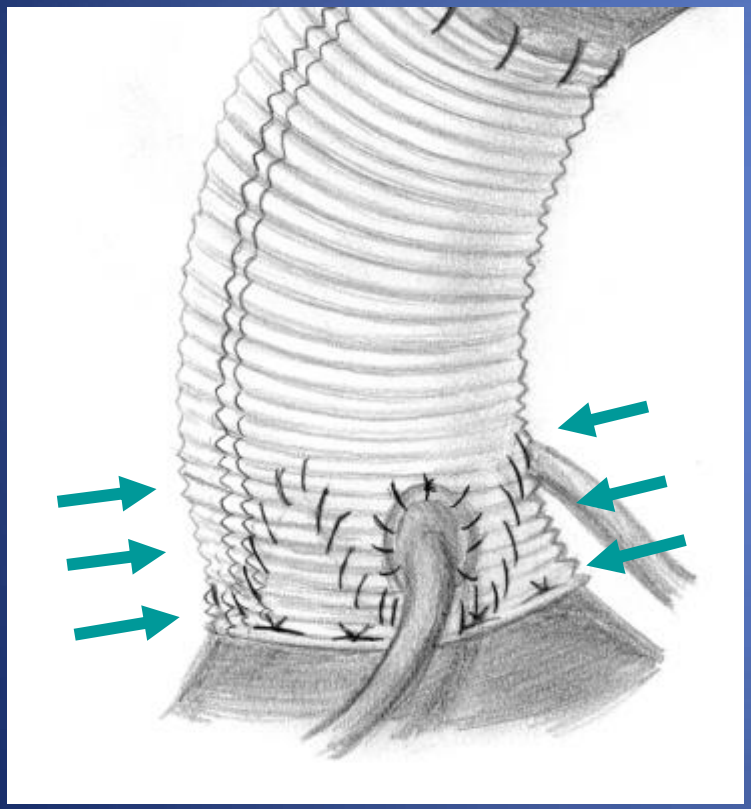


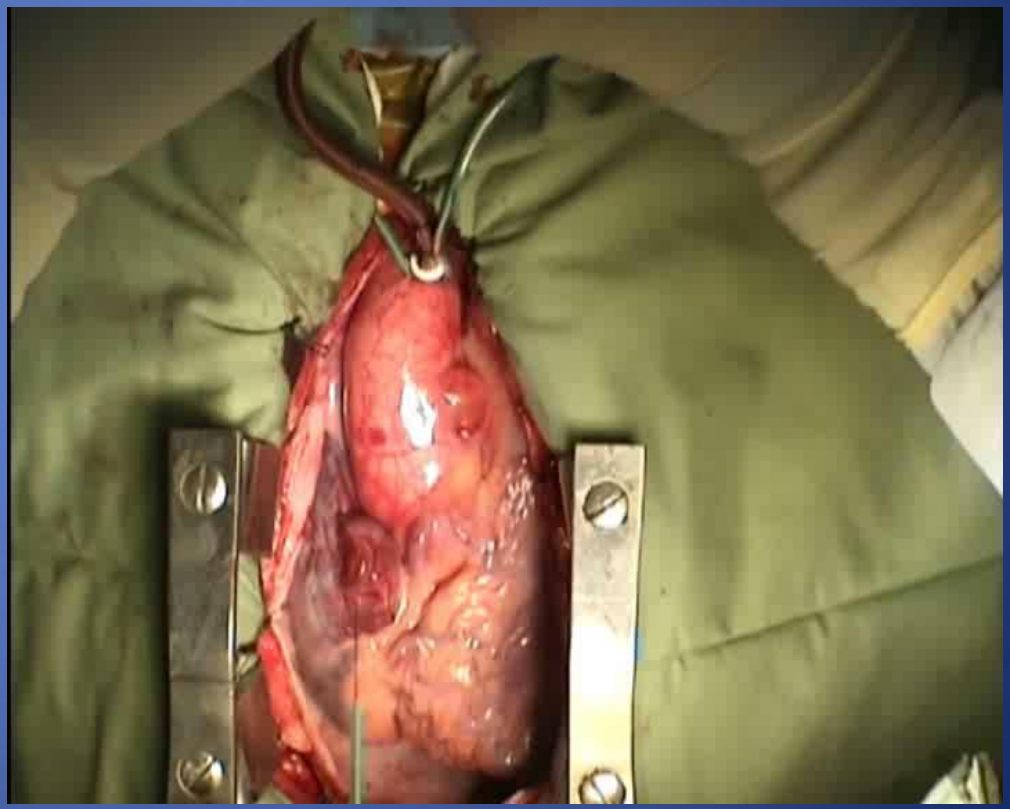
Kazui, Svensson, Schäfers 2007

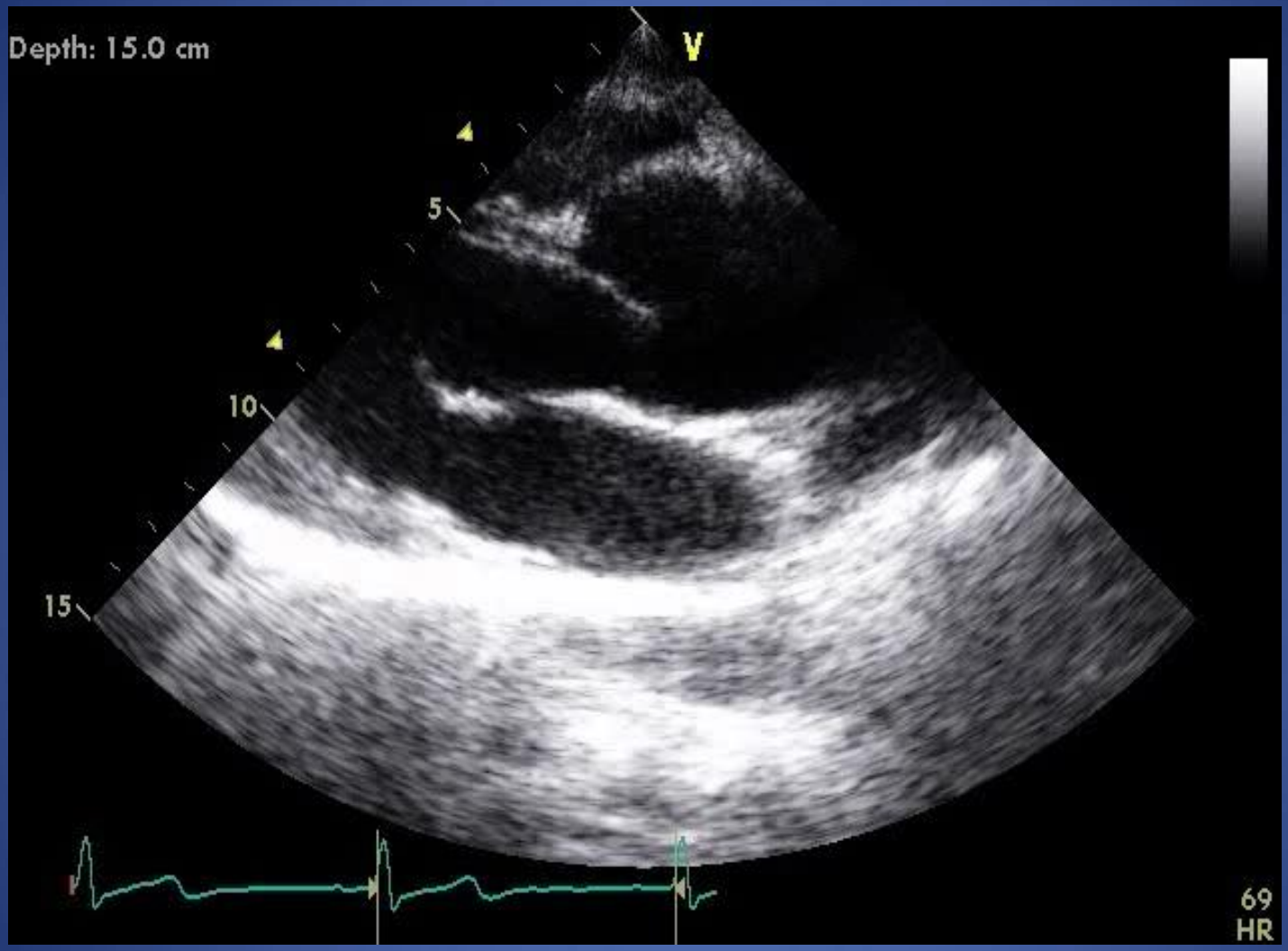
LVOT and Aortic Root Complex



RE-Implantation (David)






Depth: 15.0 cm
5
10
15
69
HR


PHILIPS
KATZ, YOAV
313595464
07/04/2010
18:43:17
TIS1.2
MI 0.6
S7-2omni/Adult
FR 61Hz
11cm
2D
56%
C 50
P Off
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0
122
180
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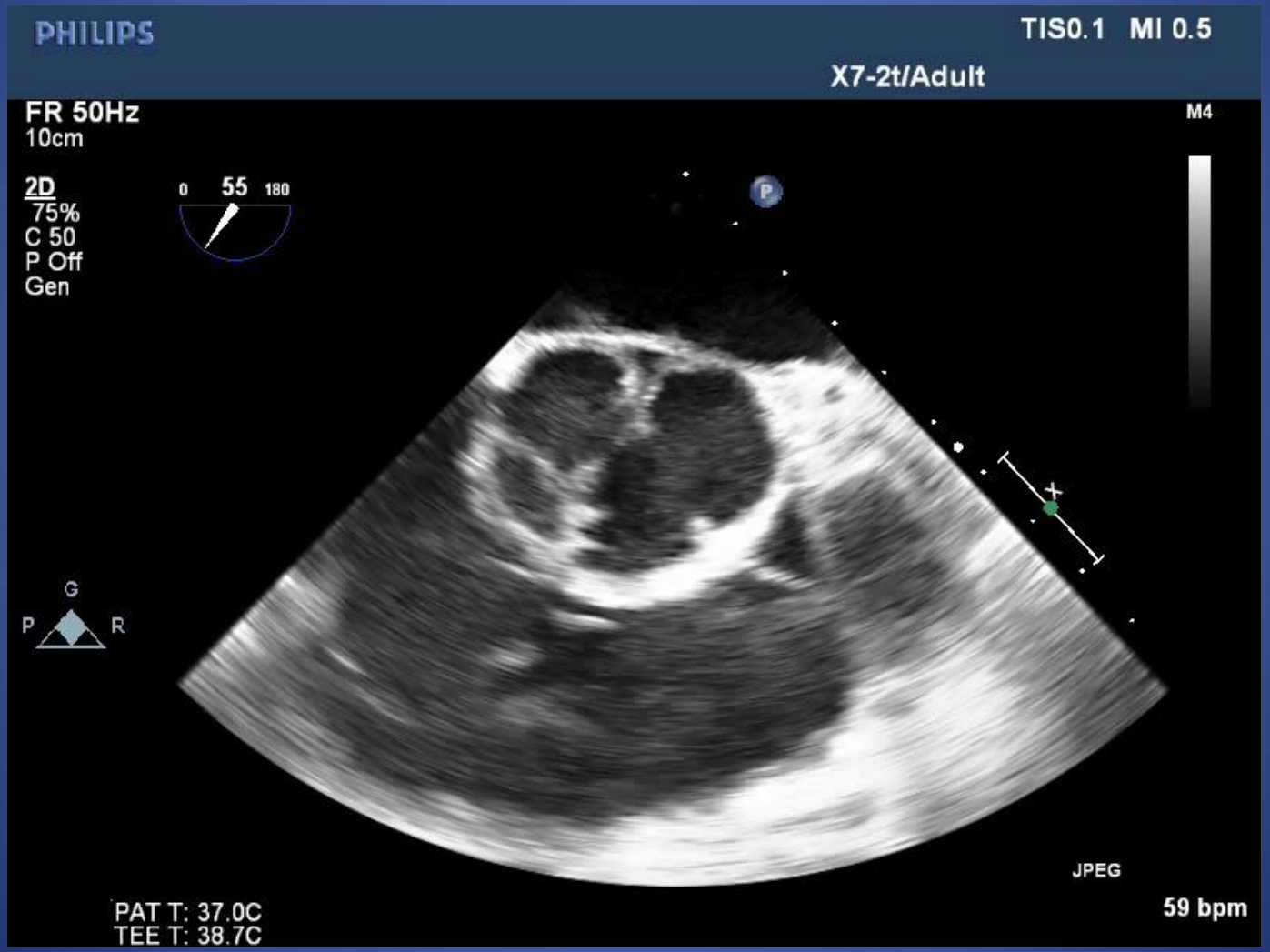
160º


PHILIPS
TIS0.1 MI 0.5
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FR 50Hz
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2D
75%
C 50
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0 55 180
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PAT T: 37.0C
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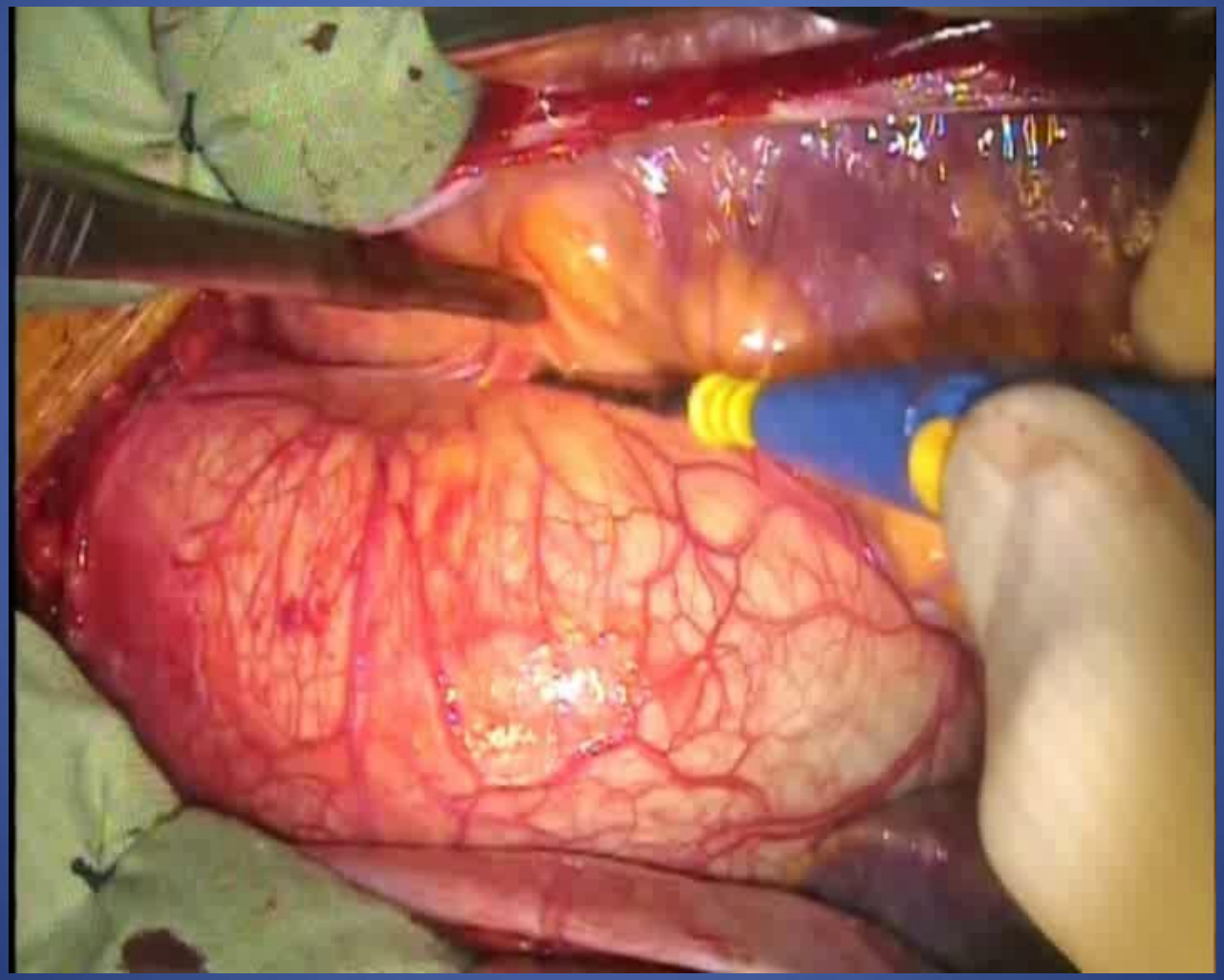
59 bpm

Re-implantation BAV



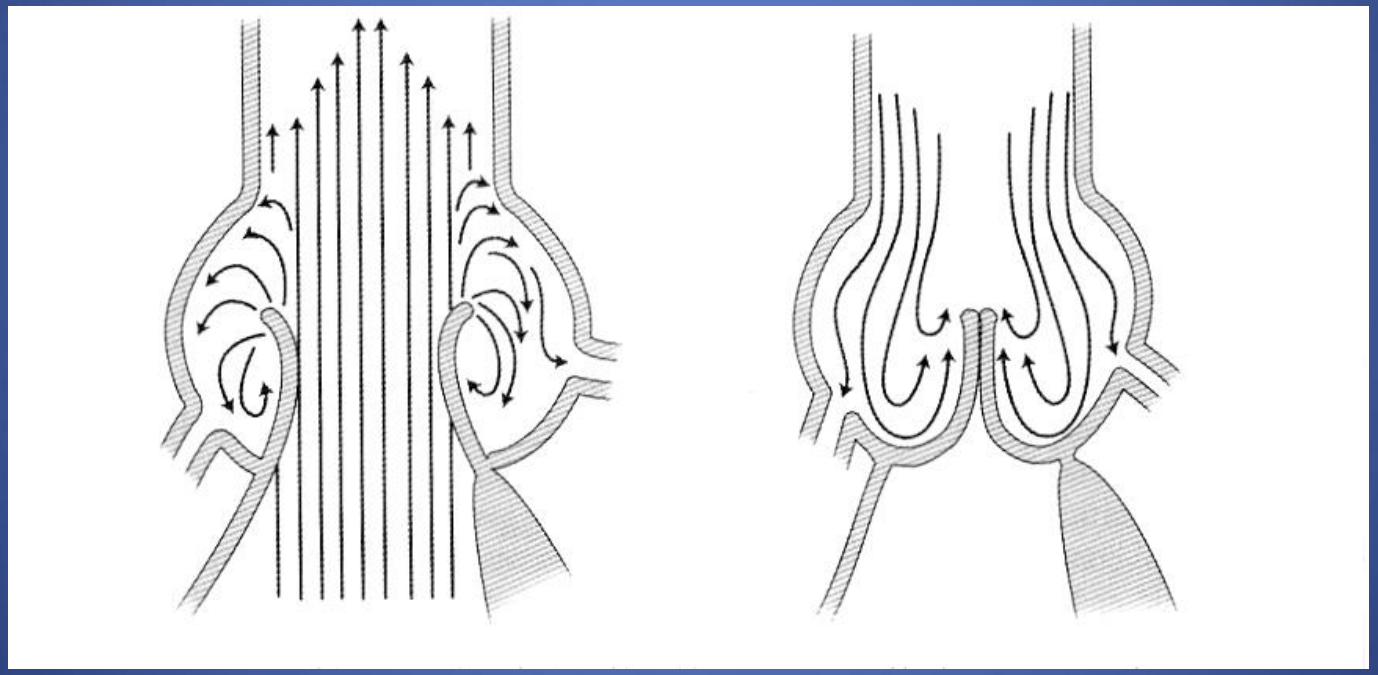
Standardized approach to valve repair using an expansible aortic ring versus mechanical Bentall: Early outcomes of the CAVIAAR multicentric prospective cohort study

Emmanuel Lansac, MD, PhD,[a] Olivier Bouchot, MD, PhD,[b] Eric Arnaud Crozat, MD,[c] Rachid Hacini, MD,[c] Fabien Doguet, MD, PhD,[d] Roland Demaria, MD, PhD,[e] Alain Leguerrier, MD,[f]

ECC time (min) mean ± SD (range)	156.1 ± 49.2 (65-315)	183.1 ± 38.7 (114-315)	129.1 ± 43.5 (65-314)	<.0001†
AC time (min) mean ± SD (range)	123.8 ± 38.1 (50-137)	147.7 ± 30.1 (103-237)	99.8 ± 29.2 (50-180)	<.0001†
Second CPB run	12 (4.6%)	11 (8.5%)	1 (0.8%)	.003*
Second CPB AC time (min)	32.0 ± 14.2 (20-65)	28.3 ± 8.7 (20-45)	65.0 (.)	.004†

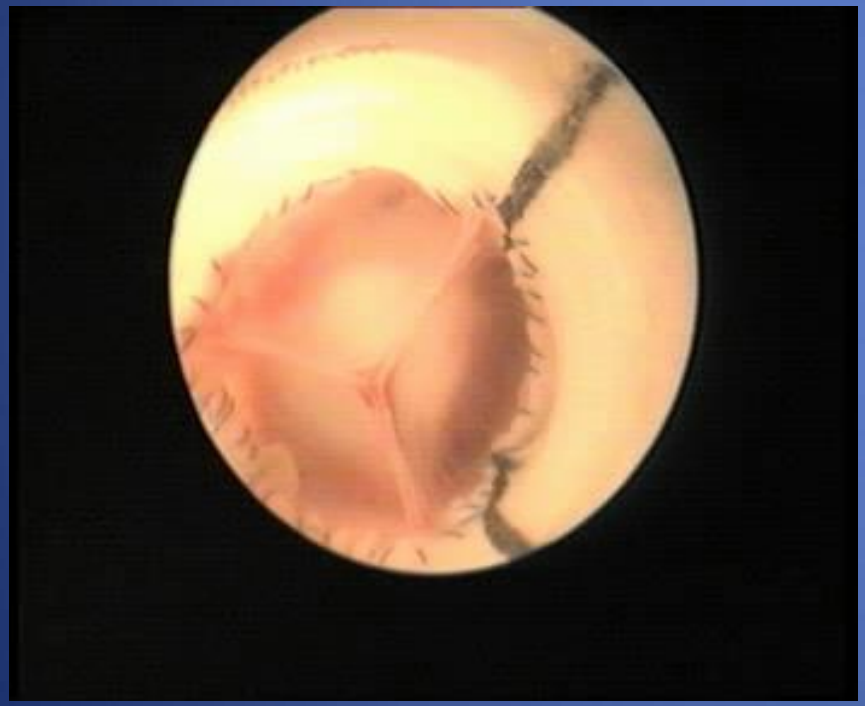
Lansac E, JTCVS 2015

Function of Aortic Sinuses

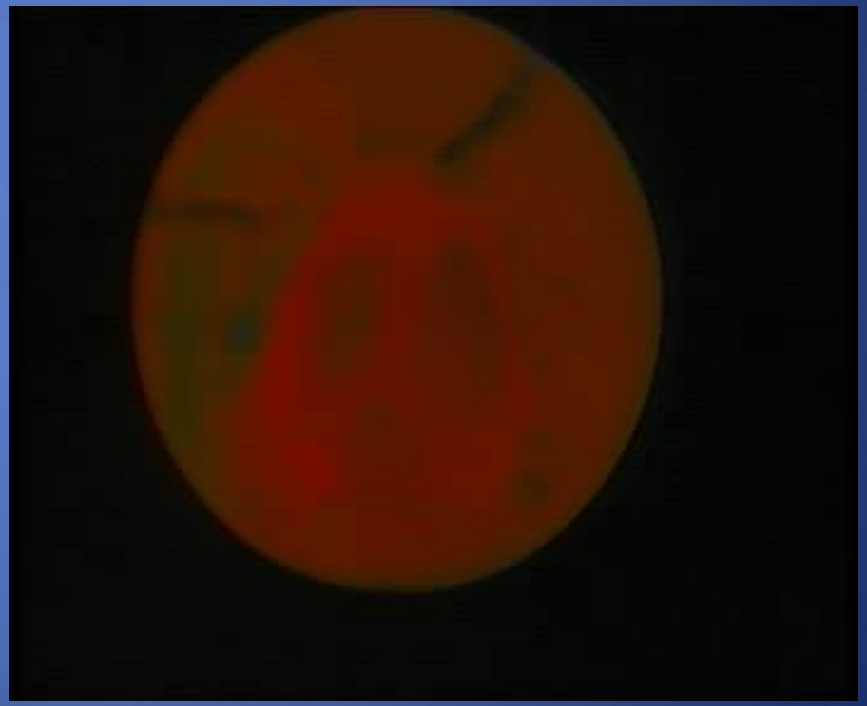


The effect of the sinuses of valsalva on cusp closure

With Sinuses

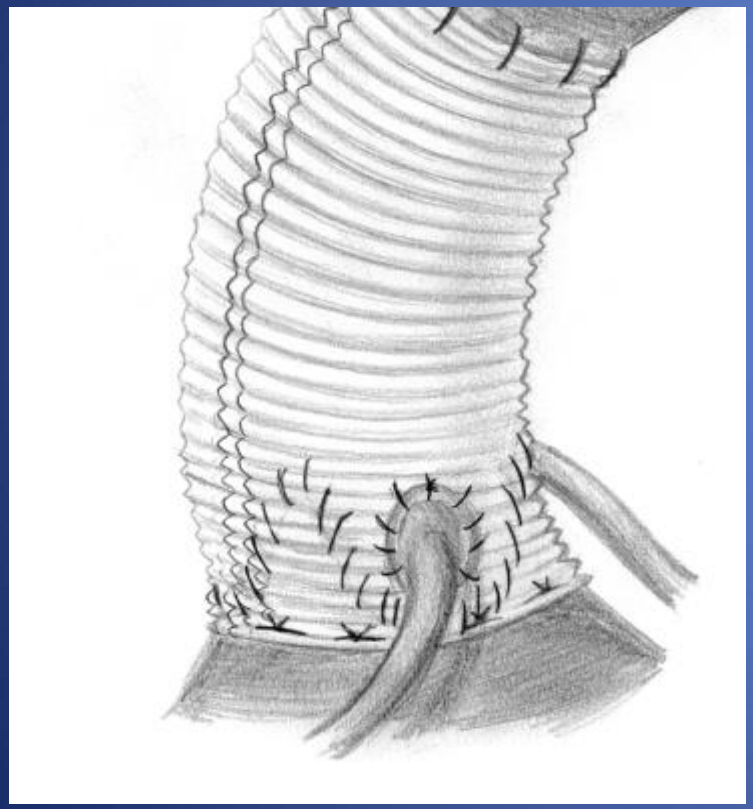


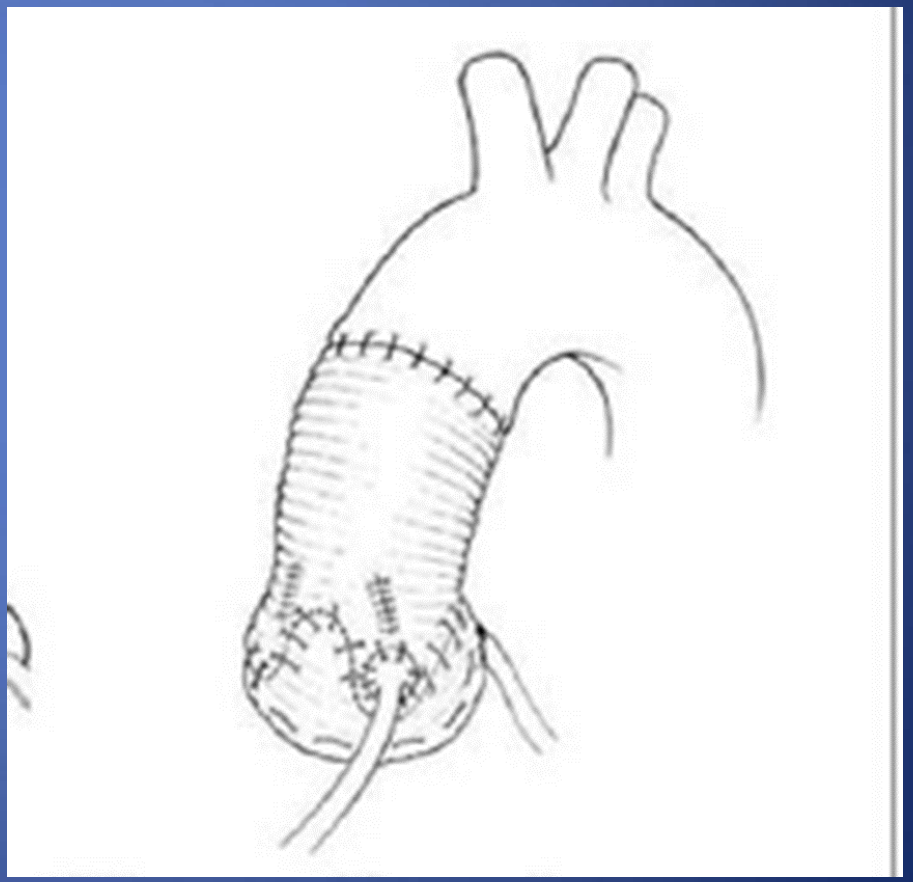
No Sinuses



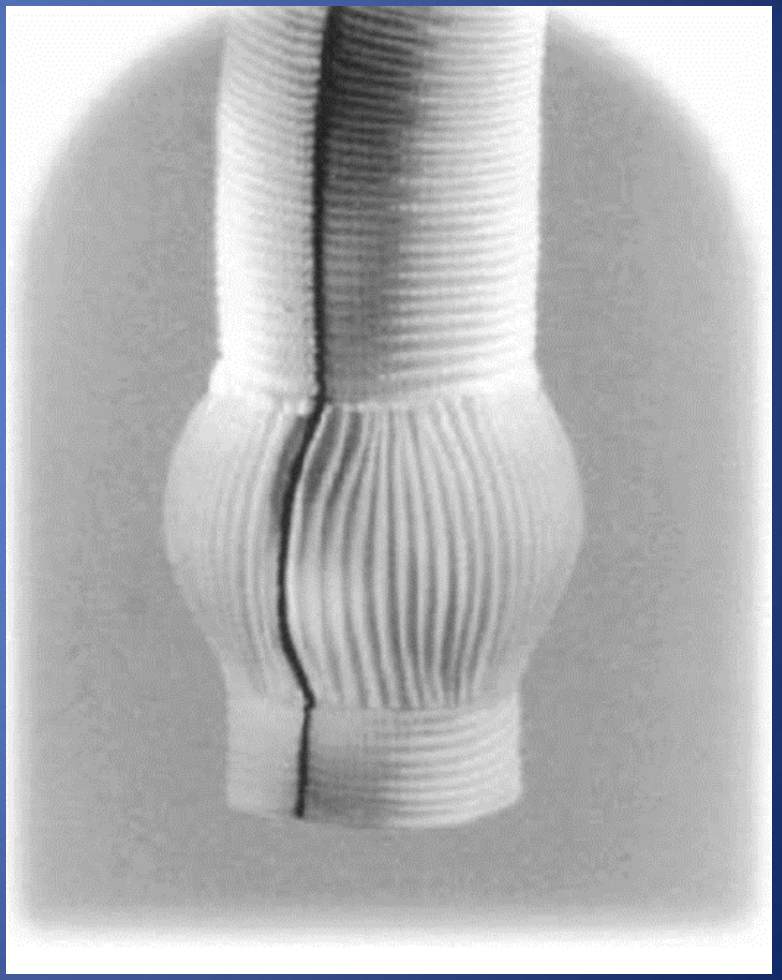
Courtesy Schafers H

Neo-Aortic Sinuses





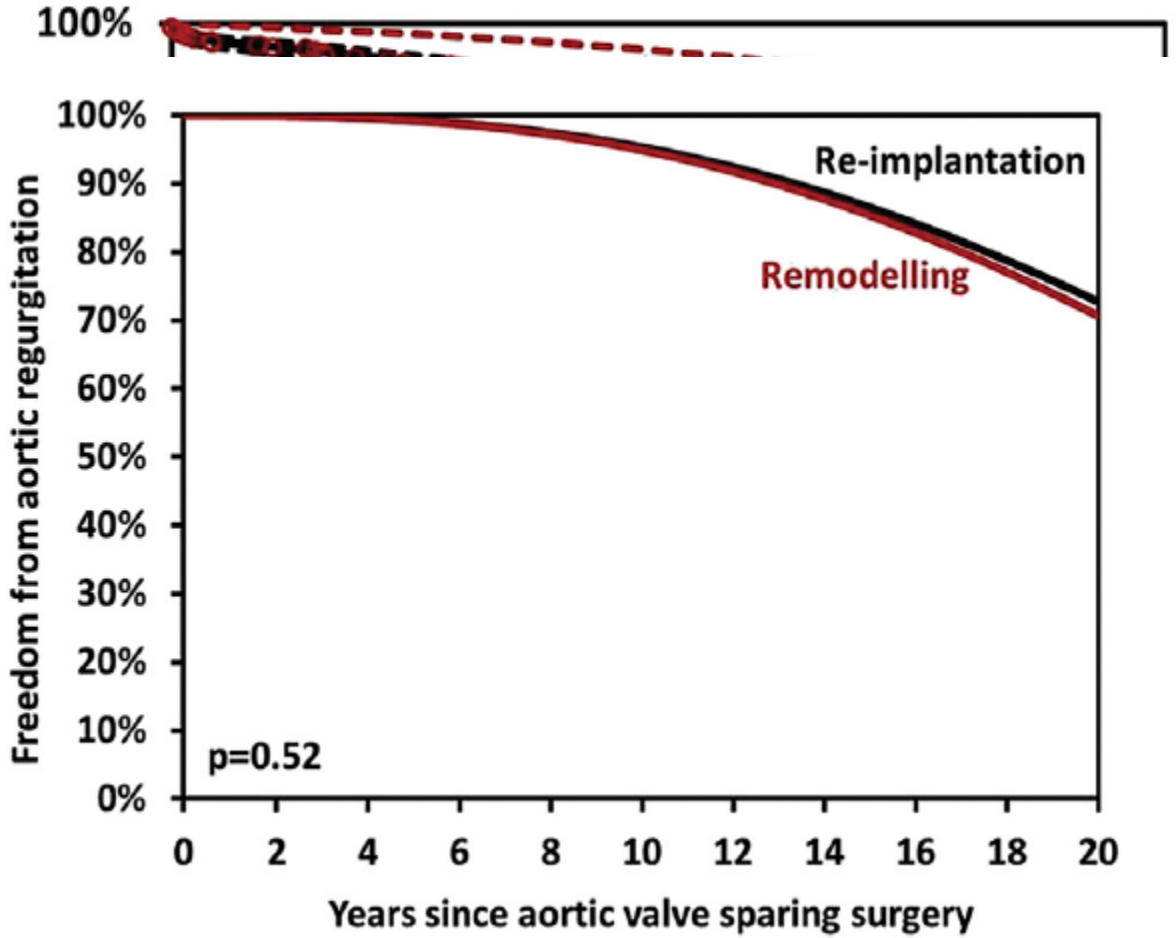
Valsalva grafts



A quarter of a century of experience with aortic valve-sparing operations

Tirone E. D , BSc

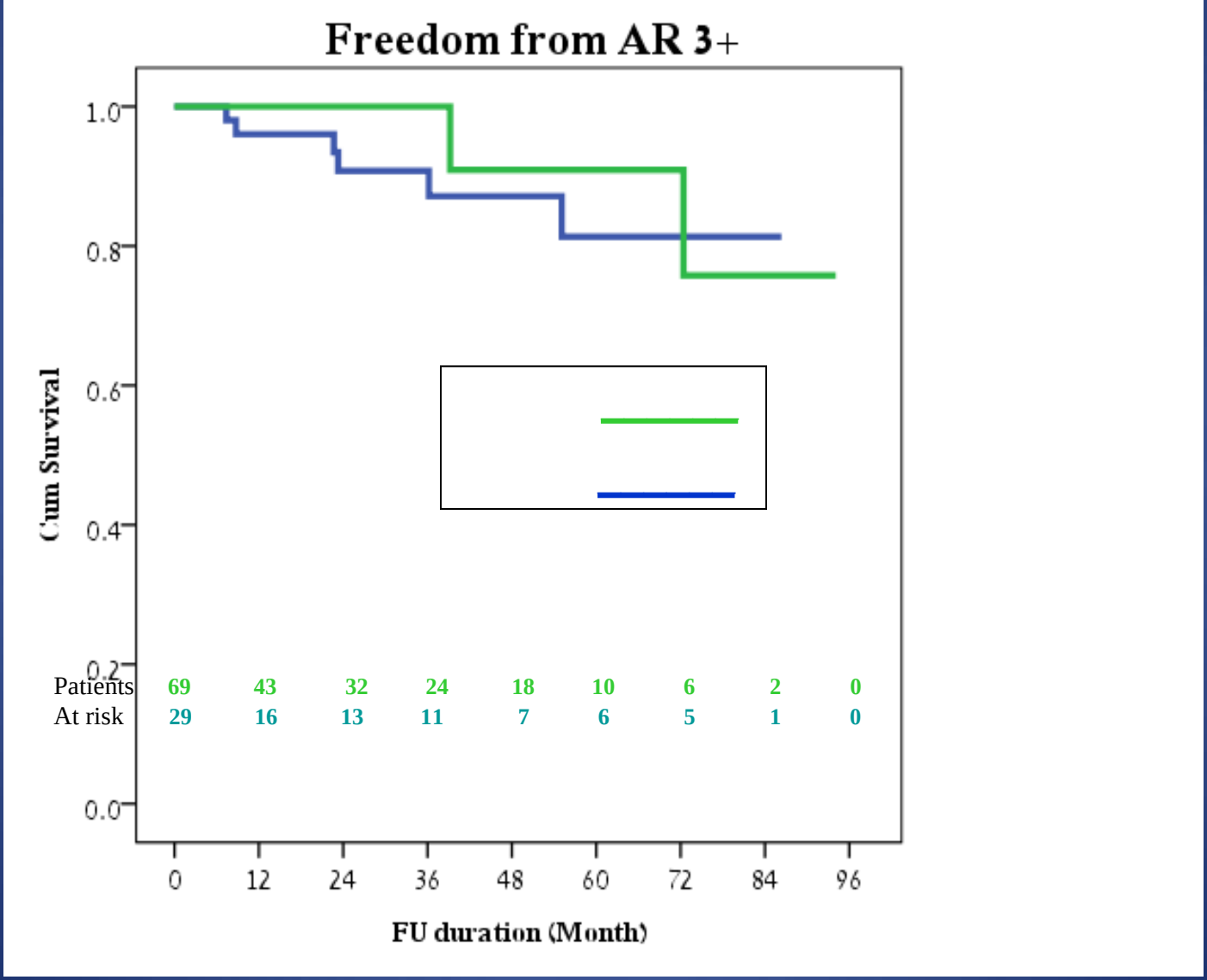
- 19
- 29
- Me



matched for age and gender.

The Journal of Thoracic and Cardiovascular Surgery • September 2014

Marfan compared to non- Marfan Patients Late Echo



Preoperative aortic root geometry and postoperative cusp configuration primarily determine long-term outcome after valve-preserving aortic root repair

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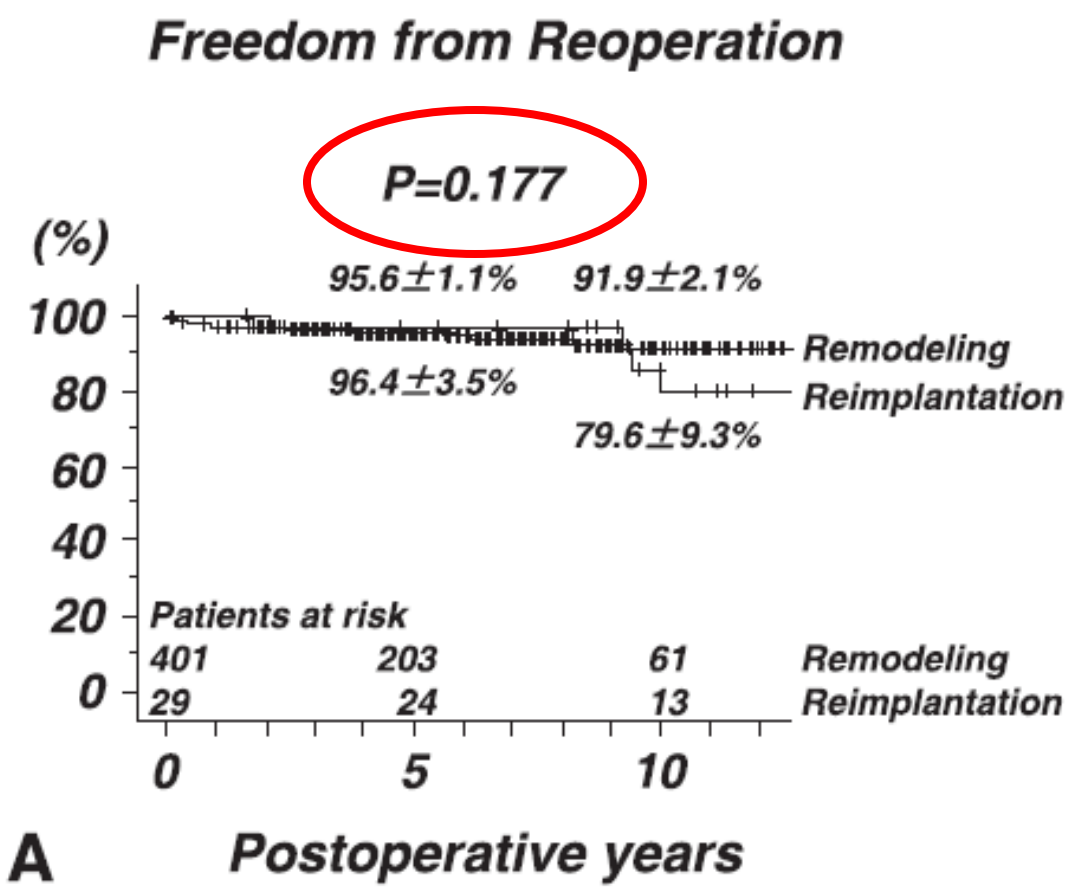
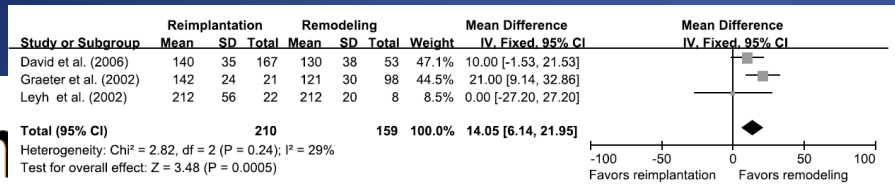


nique of root repair but by the preoperati
Cardiovasc Surg 2012;143:1389-95)

Rein emodeling: A M

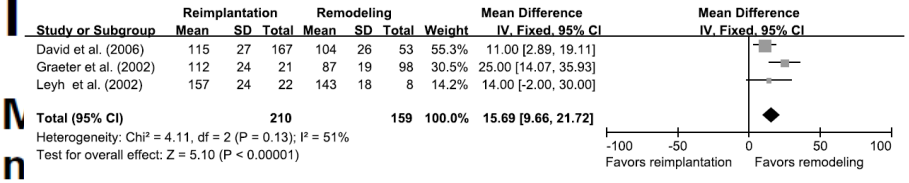
Lei Liu, M ian, M.D., Yan-Hai Meng, M.D., and Qian



Study or Subgroup	Reimplantation Mean	SD	Total	Remodeling Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
David et al. (2006)	140	35	167	130	38	53	47.1%	10.00 [-1.53, 21.53]
Graeter et al. (2002)	142	24	21	121	30	98	44.5%	21.00 [9.14, 32.86]
Leyh et al. (2002)	212	56	22	212	20	8	8.5%	0.00 [-27.20, 27.20]
Total (95% CI)			**210**			**159**	**100.0%**	**14.05 [6.14, 21.95]**

Heterogeneity: Chi² = 2.82, df = 2 (P = 0.24); I² = 29%
Test for overall effect: Z = 3.48 (P = 0.0005)

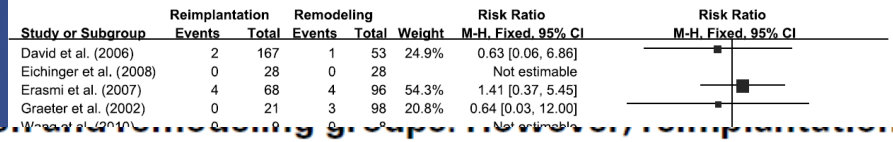
Figure 2. *CPB time for reimplantation versus remodeling.*



Study or Subgroup	Reimplantation Mean	SD	Total	Remodeling Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
David et al. (2006)	115	27	167	104	26	53	55.3%	11.00 [2.89, 19.11]
Graeter et al. (2002)	112	24	21	87	19	98	30.5%	25.00 [14.07, 35.93]
Leyh et al. (2002)	157	24	22	143	18	8	14.2%	14.00 [-2.00, 30.00]
Total (95% CI)			**210**			**159**	**100.0%**	**15.69 [9.66, 21.72]**

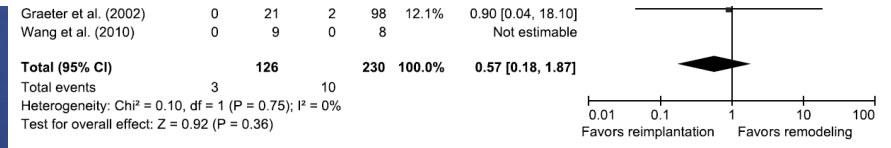
Heterogeneity: Chi² = 4.11, df = 2 (P = 0.13); I² = 51%
Test for overall effect: Z = 5.10 (P < 0.00001)

Figure 3. *Aortic clamping time for reimplantation versus remodeling.*



Study or Subgroup	Reimplantation Events	Total	Remodeling Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
David et al. (2006)	2	167	1	53	24.9%	0.63 [0.06, 6.86]
Eichinger et al. (2008)	0	28	0	28		Not estimable
Erasmi et al. (2007)	4	68	4	96	54.3%	1.41 [0.37, 5.45]
Graeter et al. (2002)	0	21	3	98	20.8%	0.64 [0.03, 12.00]
Wang et al. (2010)	0	9	0	8		Not estimable

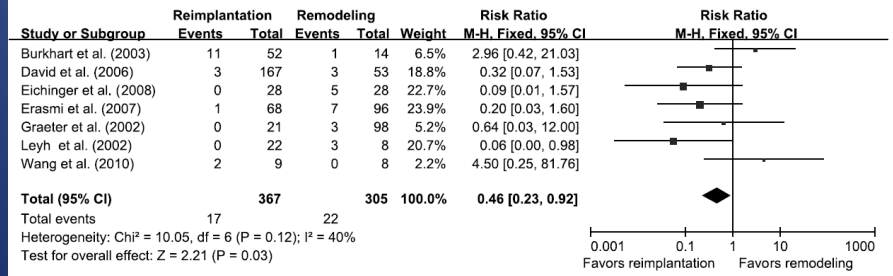
related to moderate or severe AI during follow-up (pooled RR 0.46; 95% CI 0.23 to 0.92; p = 0.03). *Conclusion:* Comparing with remodeling, reimplantation technique has less chance for reoperation related to moderate or severe AI during long-term follow-up. doi: 10.1111/j.1540-8191.2010.01171.x *(J Card Surg 2011;26:82-87)*



Study or Subgroup	Reimplantation Events	Total	Remodeling Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Graeter et al. (2002)	0	21	2	98	12.1%	0.90 [0.04, 18.10]
Wang et al. (2010)	0	9	0	8		Not estimable
Total (95% CI)		**126**		**230**	**100.0%**	**0.57 [0.18, 1.87]**
Total events	3		10			

Heterogeneity: Chi² = 0.10, df = 1 (P = 0.75); I² = 0%
Test for overall effect: Z = 0.92 (P = 0.36)

Figure 5. *Late deaths for reimplantation versus remodeling.*



Study or Subgroup	Reimplantation Events	Total	Remodeling Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Burkhart et al. (2003)	11	52	1	14	6.5%	2.96 [0.42, 21.03]
David et al. (2006)	3	167	3	53	18.8%	0.32 [0.07, 1.53]
Eichinger et al. (2008)	0	28	5	28	22.7%	0.09 [0.01, 1.57]
Erasmi et al. (2007)	1	68	7	96	23.9%	0.20 [0.03, 1.60]
Graeter et al. (2002)	0	21	3	98	5.2%	0.64 [0.03, 12.00]
Leyh et al. (2002)	0	22	3	8	20.7%	0.06 [0.00, 0.98]
Wang et al. (2010)	2	9	0	8	2.2%	4.50 [0.25, 81.76]
Total (95% CI)		**367**		**305**	**100.0%**	**0.46 [0.23, 0.92]**
Total events	17		22			

Heterogeneity: Chi² = 10.05, df = 6 (P = 0.12); I² = 40%
Test for overall effect: Z = 2.21 (P = 0.03)

Figure 6. *Reoperation related to moderate or severe AI for reimplantation versus remodeling.*

Liu Lei. J Card Surg 2011

Factors associated with the development of aortic valve regurgitation over time after two different techniques of valve-sparing aortic root surgery

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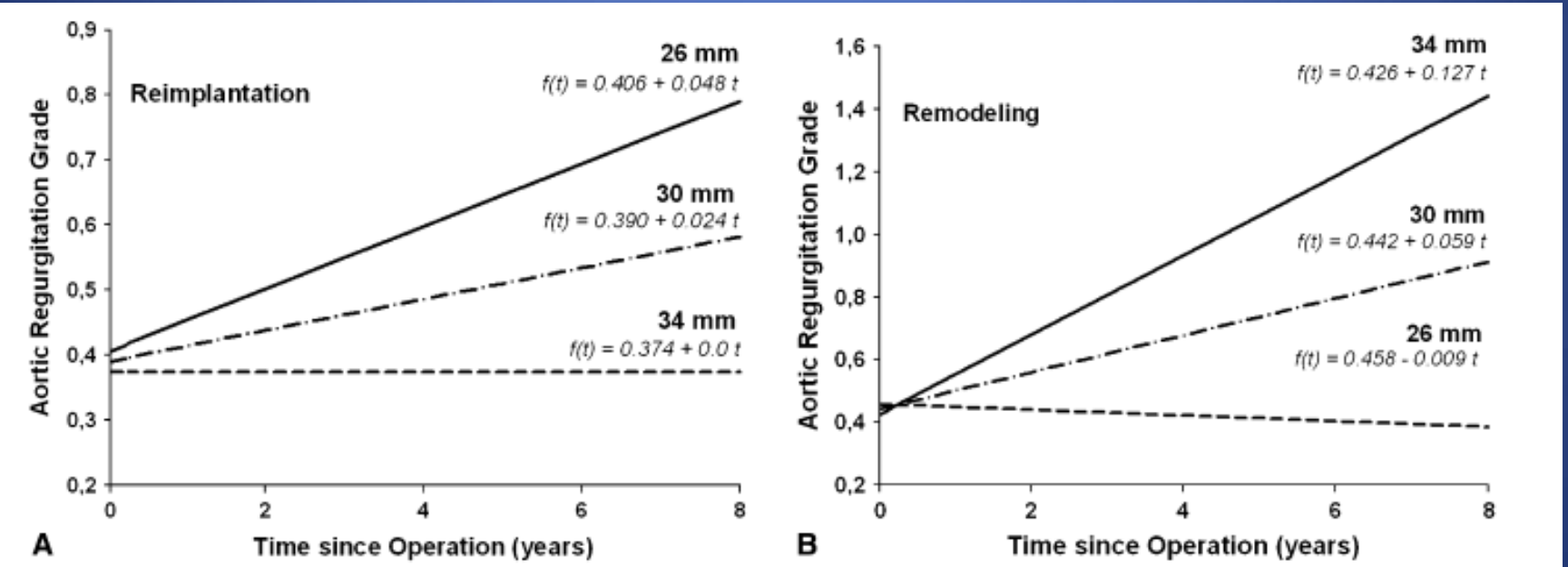


FIGURE 4. Multilevel modeling of the association of preoperative aortic annulus diameter and AR grade with time in patients treated with the reimplantation (A) and remodeling (B) techniques. With increasing diameters of the aortic annulus, aortic valve incompetence is pronounced in patients treated with the

Hanke T JTCVS 2009

VALVE-PRESERVING REPLACEMENT OF THE ASCENDING AORTA: REMODELING VERSUS REIMPLANTATION

H.-J. Schäfers, MD, PhD[a]
R. Fries, MD[b]
E. Langer, MD[a]

Objective: Aortic valve regurgitation in combination with dilatation of the ascending aorta and root requires a combined procedure to restore

Schafers HJ, JTCVS 1998

Conclusions: Depending on individual root pathologic condition, both the remodeling and the reimplantation techniques appeared to have their individual merits. Both result in adequate restoration of aortic valve function and elimination of pathologic aortic dilatation. (J Thorac Cardiovasc Surg 1998;116:990-6)

The wolf also shall dwell with the lamb, and Tiger with the kid

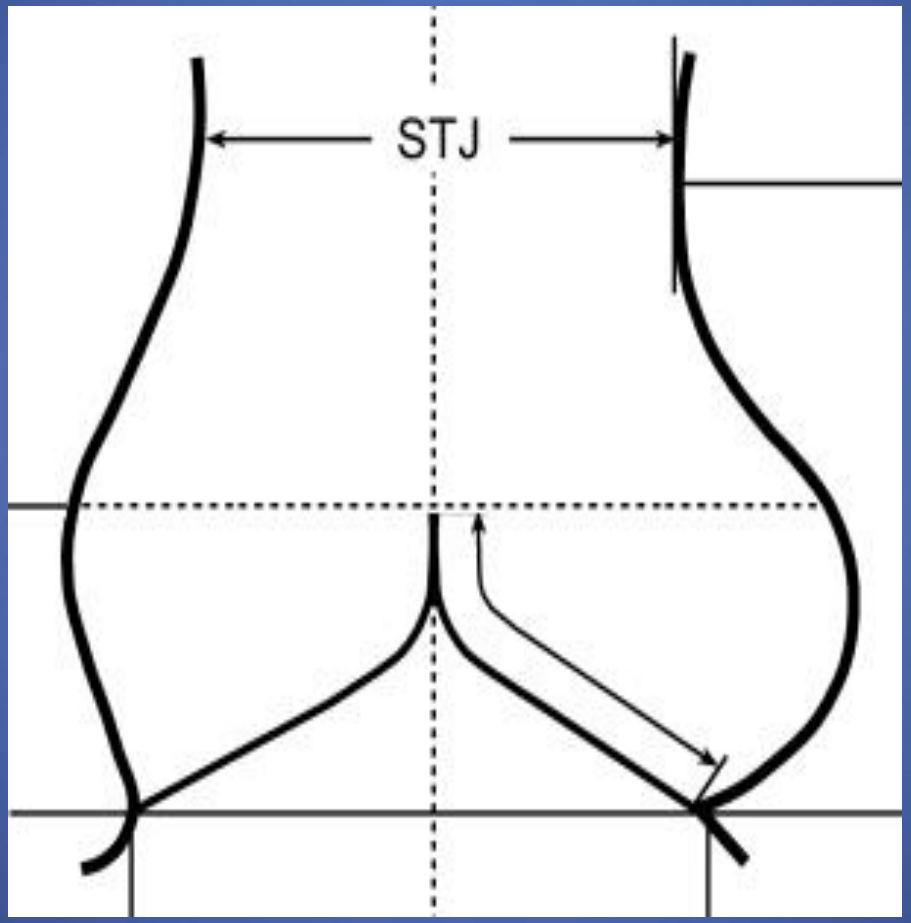
Summary I

- Re-implantation is a more complex procedure with longer operative times
- This has not seemed to affect early M&M
- Long-term outcomes are comparable mainly due to stratification of type I root to the re-implantation

Summary II

- Procedures are not competitive to each other:
  - For type 2 root aneurysm, the remodeling chould be the preferred approach
  - For younger pts with type 1 root aneurysm and genetic syndromes, re-implantation has proven to be effective with excellent long term outcomes.
- D3 or the remodeling + annuloplasty (Lansac/Schafers), may also provide good outcomes, long-term FU is needed

Restore Normal Geometry



Thank you

The Leviev Heart Center